

PATENT ABSTRACTS OF JAPAN

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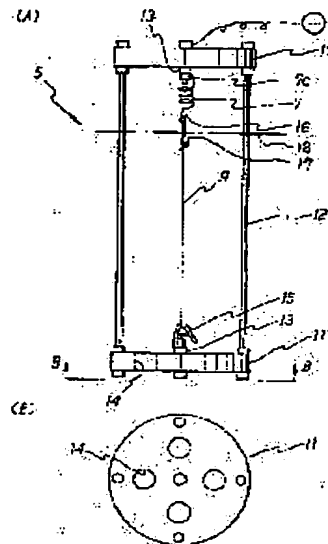
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(54) MANUFACTURING METHOD BY ELECTROFORMING OF VARIOUS KINDS OF GOLD PIPES

(57)Abstract:

PROBLEM TO BE SOLVED: To greatly improve the durability of durable materials, such as springs, and fundamentally solve the problems of the burn of resin portions of electroforming tools and the breakage of wires caused by the heat generated in a method for manufacturing the bold pipes by using one or plural pieces of columnar bodies of metallic and plastic, wires, or the like, as matrices and removing the columnar bodies after electroforming.

SOLUTION: Means of using an auxiliary hook member 17 formed by using a fine disposal metallic rod, metallic pipe, or the like, having a good electro conducting characteristic near the liquid level of an electroforming liquid is adopted.



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CLAIMS

[Claim(s)]

[Claim 1]A manufacturing method which uses the column bodies 9a, such as the wire rods 9, such as metal and a plastic, for one, uses two or more for a matrix, and is characterized by using the good disposable auxiliary hook member 17 of energization nature for a level position of electroforming solution in a manufacturing method of the various brass from which the column body 9a is removed after electroforming.

[Claim 2]A manufacturing method of the various brass according to claim 1 using metal fine rods for the aforementioned auxiliary hook member 17.

[Claim 3]A manufacturing method of the various brass according to claim 1 using the metal tube 19 for the aforementioned auxiliary hook member 17, putting the column body 9a into a hole of the metal tube 19 concerned, and fixing the column bodies 9a, such as caulking ***** 9.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacturing method of the various brass, such as a ferrule, a sleeve, etc. which are the parts an optical connector, for optical devices, etc., for example.

[0002]

[Description of the Prior Art] In the case of the ferrule for the former, for example, optical connectors, it is shape as shown, for example in drawing 1 (A) and (B), and that for which construction material used zirconia ceramics occupies the mainstream. Drawing 1 (A) is the one mind type ferrule 1, the round shape hole 2 about 0.126 mmphi is punched at a center with a thickness [of 2 mm] phi grade, and cylindrical shape about 8 mm in length, and drawing 1 (B) is a double face type thing.

[0003] The metal ferrules manufactured with metal, such as nickel, by the method of on the other hand machining it after this invention person electroforms metal or the wire rod of a plastic to a matrix in Japanese Patent Application No. No. 375372 [ten to] using two or more [1 or] and removes the wire rod concerned are proposed.

[0004] In the patent concerned, if electrocasting is carried out and it explains in detail with the device of an outline as shown, for example in drawing 2, in drawing 2, it comprises the electroforming solution 3, the positive electrode 4, the holding jig 5, the compressed-air-agitation nozzle 6, the spring 7, the negative terminal 8, and the wire rod 9.

[0005] It has composition which arranged the positive electrode 4 which put the nickel ball at the titanium basket of the cylindrical shape in the electroforming solution 3 which uses as the main ingredients the nickel amiosulfonate etc. which were warmed on four corners focusing on the holding jig 5, It sets focusing on the holding jig 5 with the negative terminal 8 which fixed the wire rod 9 to the state where it pulled with the spring 7, and the method of sending and electroforming a direct current is proposed, blowing off and agitating a little exhaust air from the air stirring nozzle 6.

[0006] In the method concerned, although stainless lines, aluminum alloy wire, etc. are used for a wire rod, When it is going to carry out above the oil level 18 of the electroforming solution 3 like drawing 3 (A) and is going to electroform, especially, since energization nature is not so good in the case of stainless lines etc., If it tries to pass a predetermined current value, voltage will become high and will generate heat, fall into the vicious circle to which resistance becomes still higher with this heat, and since the current value is gradually made high as electrocast products become thick, The resin part of a electrocasting jig is burned during electrocasting with the heat which it generates in being extreme, or, Or if it puts in the electroforming solution 3 to hooking portions, such as a spring which is an endurance use member like drawing 3 (B), in order to sometimes generate the fatal problem that a line is turned off and to avoid this phenomenon for example, Also when there was also a problem it is thickly electroformed by the hooking portion, stick to it, and it becomes impossible to use only once and the sleeve for optical connectors was manufactured in a similar way, there was same problem.

[0007]

[Problem(s) to be Solved by the Invention] It is making into the technical problem for this invention to solve problems, such as a glow etc. of the resin part of the electrocasting jig by the heat generated on a line during energization, without putting endurance use members, such as a spring part, in electroforming solution in view of the above.

[0008]

[Means for Solving the Problem] In order to solve said technical problem, a means to use the auxiliary hook member 17 of good throwing away of energization nature as shown in drawing 4 was used for this invention.

[0009]

[Embodiment of the Invention]

[0010] When an embodiment of the invention is described in more detail, in drawing 2, the electroforming solution 3 is the construction material of the electroforming metal made into the purpose, and differ, respectively, but. For example, nickel or its alloy, iron or its alloy, copper or its alloy, cobalt, or its alloy, Electroforming metals, such as a tungsten alloy and particle distribution metal, are employable, Nickel amiosulfonate, nickel chloride, nickel sulfate, the first iron of sulfamic acid, The first iron of the Howe fluoridation, a pyrophoric acid trunk, copper sulfate, the Howe copper fluoride, cay copper fluoride, The solution which uses solution, such as titanium copper fluoride, alkanol copper sulfonate, cobalt sulfate, and sodium tungstate, as the main ingredients, Or the liquid which made these liquid distribute impalpable powder, such as silicon carbide, tungsten carbide, boron carbide, zirconium oxide, CHITSU-ized silicon, alumina, and a diamond, is used. The bath which uses nickel amiosulfonate as the main ingredients especially

among these is suitable in respect of the diversity of physical properties, such as the ease of doing of electrocasting, and hardness, chemical stability, the ease of welding, etc. And as for electroforming solution, it is desirable to carry out high rate filtration, and to warm with a filter with a filtering accuracy of about 0.1–5 micrometers, and to carry out a temperature control to the appropriate temperature range of about $\pm 3^\circ\text{C}$, and to sometimes carry out activated carbon treatment, and to remove organic impurities.

[0011]The positive electrode 4 changes with target electroforming metals, and is selected from nickel, iron, copper, cobalt, etc., and a tabular and spherical thing is suitably used for it. What is necessary is just to use it, putting into the basket made from titanium and covering with the cloth bag made from polyester, when using a spherical thing. And composition and intermediary Ni^{2+} which arranged four positive electrodes focusing on the column bodies 9a, such as the wire rod 9.

[0012]With the four supports 12, the support fixture 5 is composition as shown, for example in drawing 4, they are fixed with screws by the superior lamella 10 and the inferior lamella 11, and the superior lamella 10 and the inferior lamella 11, Electrical insulation materials, such as polyvinyl chloride resin, polyamide resin, polyacetal resin, and polyethylene resin, are used, and metal or plastics, such as stainless steel and titanium, are used for the support 12. It fixes with a screw and the superior lamella 10, the inferior lamella 11, and the support 12 fix the spring 7 made from stainless steel in the center of the superior lamella 10 with the stainless steel screw 13. The clip 15 made from a plastic is fixed with screws in the center of the inferior lamella 11, and it has the composition that the circular hole 14 for air jet holes was punched at four places. After fixing the disposable auxiliary hook member 17 to the hook part 16 of the spring 7, What is necessary is to change into the state where the column bodies 9a, such as the wire rod 9, were fixed and pulled to the auxiliary hook member 17 concerned at the lower part, and the spring 6 was lengthened, it was inserted and pulled by the Ni^{2+} clip 15, and the column bodies 9a, such as the wire rod 9, became straight, and just to make it the oil level 18 of electroforming solution come near the center of the auxiliary hook member 17 concerned.

[0013]The metal fine rods which have the moderate intensity which is pulled with the good spring of energization nature, and is extended, or does not go out are suitable for said auxiliary hook member 17, After fixing so that the line 9 may be put into the metal tube 19 concerned, about three caulking parts 20 may be formed and the column bodies 9a, such as the wire rod 9, may not be moved as shown in drawing 5 (b) using the metal not a fine rod but metal tube 19 as shown, for example in drawing 5 (a), The method of forming the hooking portion 21 by bending after crushing the metal tube 19 in the upper part may be adopted, And the good thing of energization nature, such as pure copper without an oxide or a copper alloy, of the construction material of the auxiliary hook member 17 is good, and a function can be made to serve a double purpose by adopting this method as immobilization and the auxiliary hook member of the column bodies 9a which were trouble conventionally, such as the wire rod 9.

[0014]The column bodies 9a, such as the wire rod 9, iron or its alloy, aluminum, or its alloy, Metal wires, such as copper or its alloy, and a tungsten alloy, and the thing which carried out the thin solder plate on this metal wire, And selection use is suitably carried out from ceramic lines, such as plastic lines, such as nylon and polyester, and glass, etc., and, as for the case of a plastic and a ceramic line, electroless deposition, such as nickel and silver, is needed for the surface for conductive grant. Thickness, deviation from circular form, and accuracy high to linearity are required, the column bodies 9a, such as the wire rod 9, should just adjust by extrusion by a dice, etc., and their iron alloys, such as SUS which is especially an iron alloy, are desirable.

[0015]. Although electrocasting is carried out with the above devices, electrocasting carries out a direct current with the current density about $4 - 10 \text{ A/dm}^2$, and grow up it into cylindrical predetermined thickness. When the addition current amount which begins by low current in the beginning, raises current gradually in that case, and turns into a predetermined precipitation amount (thickness) every holding jig 5 at it is reached, it is desirable to have composition in which the current from a rectifier goes out automatically.

[0016]Although it is determined whether kinds, such as the column bodies 9a, such as the wire rod 9 to choose, draw out the column body 9a which exists at the center of electrocast products, it extrudes, or it dissolves with medicine, What is generally hard to dissolve in medicine, and draws out what has high tensile strength, or uses extrusion, and it is easy to dissolve in medicine uses the dissolution.

[0017]What is necessary is just to carry out finish by a centerless process etc. in machining, after drawing out the column body 9a in the case of drawing. After dissolving the column body 9a after electroforming with one stick in the dissolution and cutting into the length of an outline, carrying out finish after checking that the hole has penetrated, or finish-machining and making it a finished product, the method of removing the column body 9a may be adopted.

[0018]

[Effect of the Invention]By adopting a means to use the auxiliary hook member 17 of good throwing away of energization nature for the level position of electroforming solution according to the method of this invention, Since a spring part is not put in electroforming solution, the endurance of durable material, such as a spring, can be improved remarkably, Energization of a line is poor and the fatal problem of a glow of the resin part of the electrocasting jig by the heat to generate and pieces, such as a wire rod, can be solved fundamentally, A function can be made to serve a double purpose by adoption of the metal small tube 19 as immobilization and the auxiliary hook member of the column bodies 9a which were trouble conventionally, such as the wire rod 9.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is the expanded sectional view and side view of a ferrule concerning a conventional method.

[Drawing 2]It is a lineblock diagram of the outline of the electroforming device concerning a conventional method.

[Drawing 3]It is a side view of a holding jig showing the position of the oil level of electroforming solution of the electroforming device concerning a conventional method.

[Drawing 4]It is the side view and top view of a holding jig showing one example of the electroforming device concerning this invention.

[Drawing 5]It is an expansion sectional side elevation showing one example in the case of using the metal tube 19 concerning this invention.

[Description of Notations]

1 Ferrule Two Round shape hole

3 Electroforming solution 4 positive electrodes

5 Holding jig Six Compressed-air-agitation nozzle

7 Spring 8 negative terminals

9 Wire rod 9a Column body

10 Superior lamella 11 Inferior lamella

12 Support 13 Stainless steel screw

14 Circular hole 15 Clip

16 Hook part 17 auxiliary-hook member

18 Oil level 19 Metal tube

20 Caulking part 21 hooking portions

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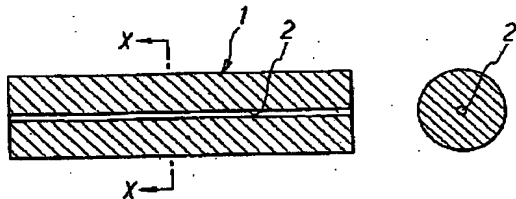
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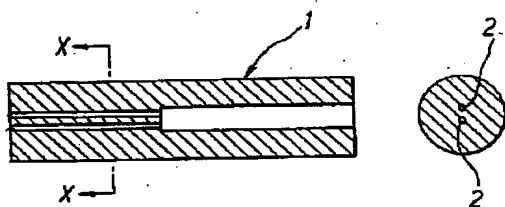
DRAWINGS

[Drawing 1]

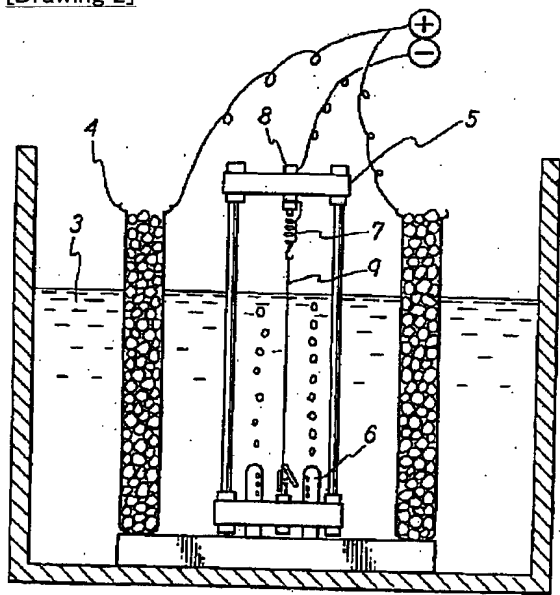
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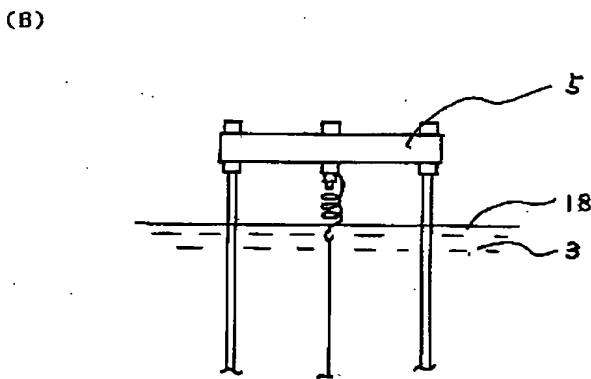
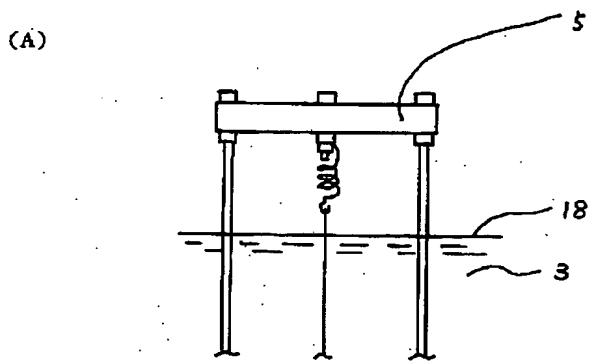
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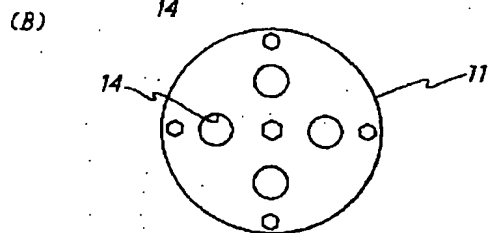
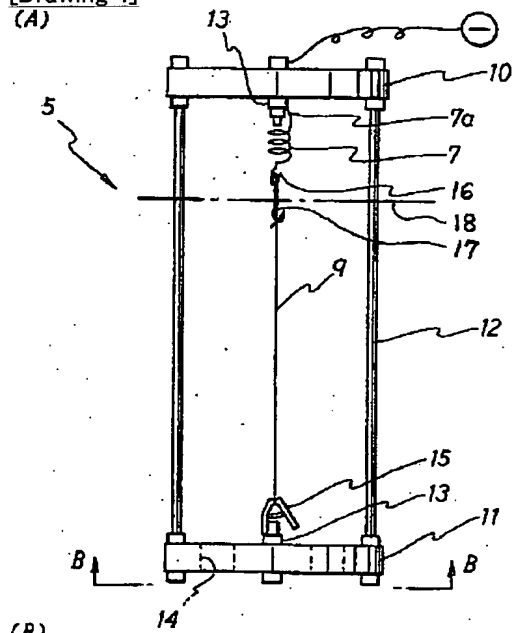
[Drawing 2]



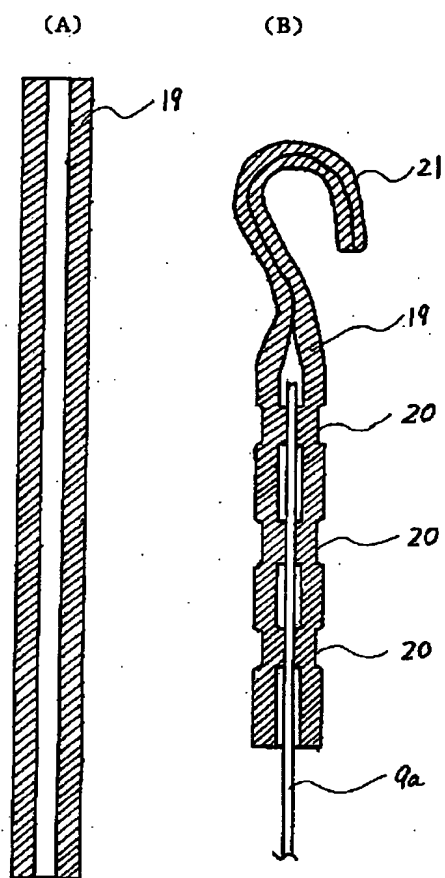
[Drawing 3]



[Drawing 4]



[Drawing 5]



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